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Success Story

EARLY WARNING SYSTEM DEVELOPED TO DETECT WIRE CHAFING

Better monitoring of aviation wire systems may keep aging commercial and military aircraft safer for the millions of passengers and crew who fly daily. Damaged wiring poses a serious threat to public health and safety and may result in smoke, fire, or failure of essential functions.

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Accomplishment

Killdeer Mountain Manufacturing (KMM) of Killdeer, North Dakota, the Montana State University Tech-Link Center (a technology transfer organization) of Bozeman, Montana, and the Information Directorate, teamed up to refine technology that detects damaged wiring in aircraft before it creates a hazard. Aircraft structures contain many miles of electrical wiring with the potential to become dangerously worn and frayed from years of vibration and rubbing against other aircraft parts.

Wire chafing may cause a short circuit in an aircraft's electrical system or spark a fire, both potential sources of disaster. Finding damaged wiring is a difficult task. A Boeing 747, for example, has over 150 miles of wiring, much of it located in inaccessible areas of the aircraft.

This early warning system could augment regular aircraft inspections and vastly improve aircraft safety. It could detect and locate areas where wire chafing is just beginning, long before the electrical insulation has worn off and damage occurs.

KMM developed several sensing technology embodiments, which will be tested and refined under actual operating conditions. This technology also has the potential for detecting early wear in non-wiring components such as hydraulic lines and fuel lines in airborne and surface vehicles.

Background

The National Science and Technology Council issued a review on wire system safety last year, concluding that wire system safety is an important public health and safety issue that transcends government agencies. Wire chafing may figure prominently in a growing number of malfunctions.

The National Aeronautics and Space Administration's (NASA) venerable Space Shuttle suffered wire chafing problems. An electrical short caused the loss of two main engine components during the launch of the Shuttle Columbia.

Wire chafing accounts for 37% of wire system failures in reported military aircraft hazardous incidents, while short circuits and unspecified failures account for another 24%, for a total of 61% attributed to wire chafing. Killdeer plans to integrate the directorate's technology into its wire harness assemblies to create a wire-chafing detector that is poised to become part of an important safety system for our nation's commercial and military aircraft.

Information
Technology Transfer

Additional information

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